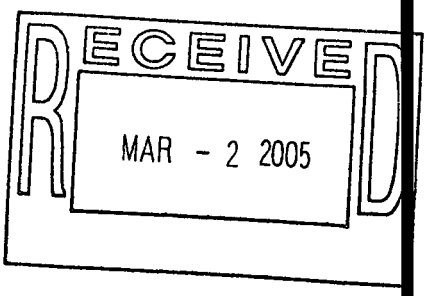
Rocky Flats Environmental Technology Site

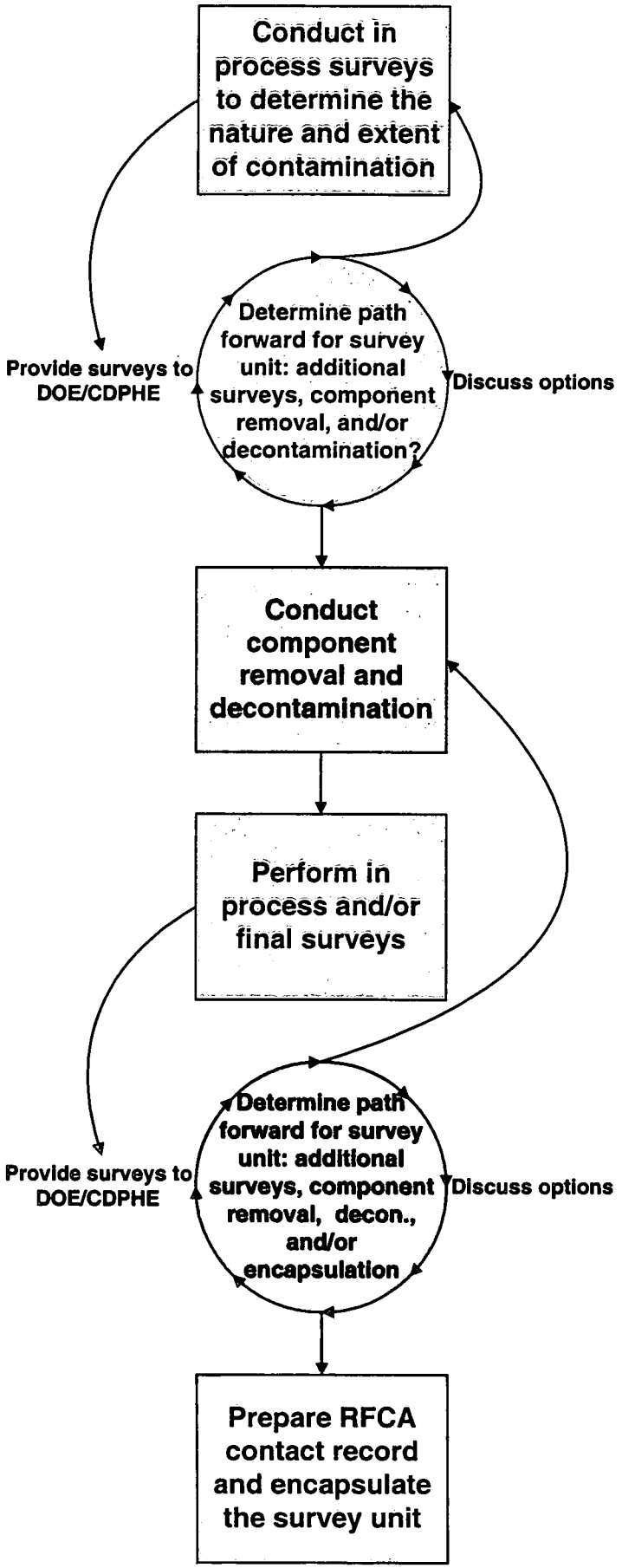
Building 776/777 2nd Floor Final Survey Report

Survey Unit: 776029

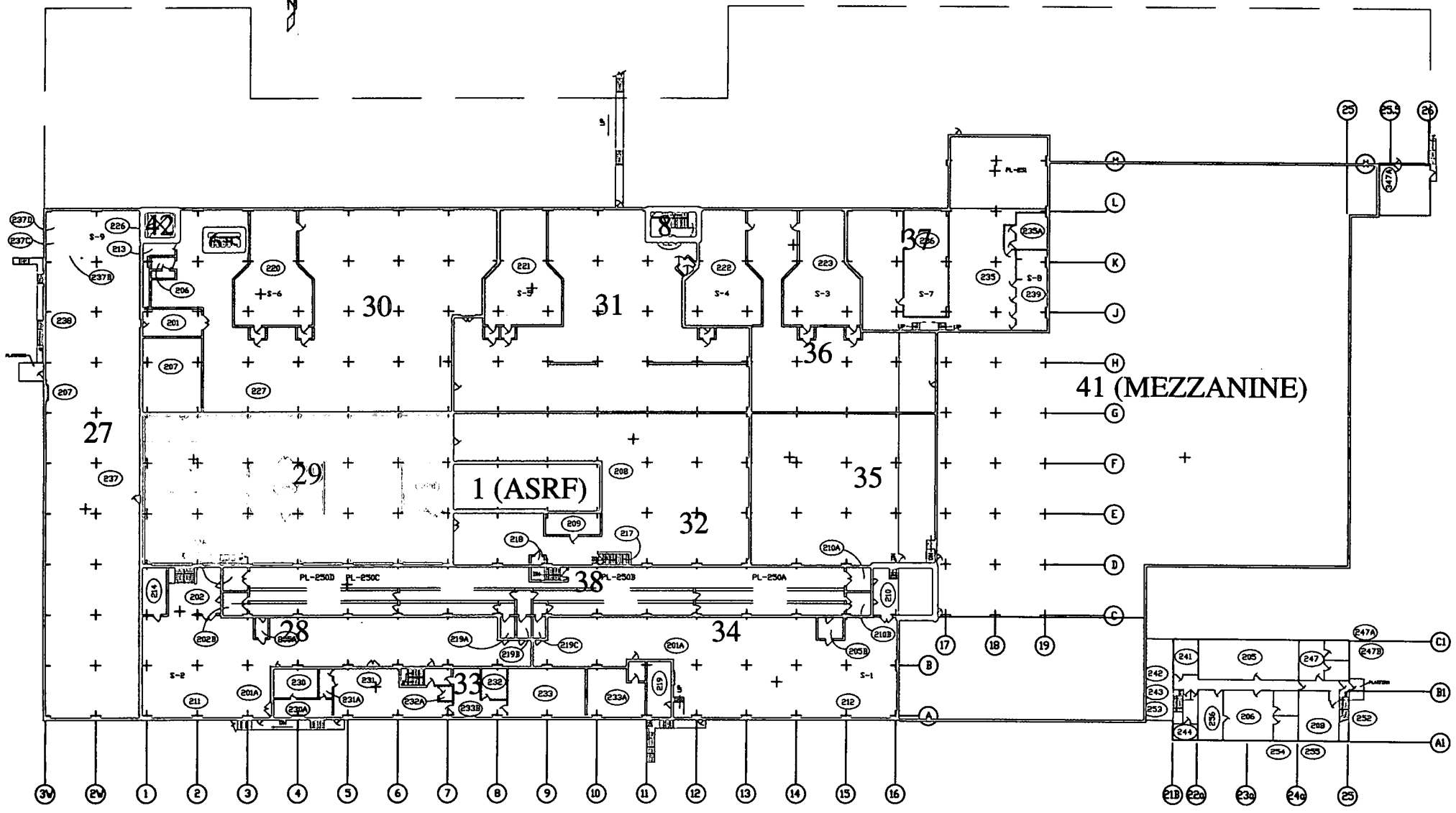


Copy

December 2004


Conduct in process surveys to determine the nature and extent of contamination
Provide surveys to DOE/CDPHE
Determine path forward for survey unit: additional surveys, component removal, and/or decontamination?
Discuss options
Conduct component removal and decontamination
Perform in process and/or final surveys
Provide surveys to DOE/CDPHE
Determine path forward for survey unit: additional surveys, component removal, decon., and/or encapsulation
Discuss options
Prepare RFCA contact record and encapsulate the survey unit

B776/777 INITIAL SURVEY UNITS
2nd FLOOR



FINAL SURVEY REPORT
Survey Unit 776029

Introduction and Scope

A pre-demolition radiological survey (PDS) is performed prior to building demolition to define the radiological conditions of a facility. A PDS survey for survey unit 776029 has been completed in accordance with guidelines outlined in the "Radiological Pre-Demolition Survey Plan Building 776/777". Based on the results it is recommended that no further remediation is needed, and that the survey unit may be encapsulated in preparation for demolition. Isolation controls shall be put in place to prevent re-contamination of the area. This report has been prepared in accordance with sections 3 and 8 of the "Radiological Pre-Demolition Survey Plan Building 776/777".

Survey unit 776029 includes room 225, and the south portion of room 227, between column lines D-G, and 1-7 of Building 776.

PDS Methods and Techniques

The PDS survey results determine the Average Surface Contamination Value ($ASCV_u$) and source term for the survey unit. These parameters are used to determine whether the building may be demolished within the limits outlined in the "Radiological Pre-Demolition Survey Plan Building 776/777".

To comply with the "Radiological Pre-Demolition Survey Plan Building 776/777", a minimum of 30 survey points were selected per survey unit. A random start, systematic grid method was used to identify the survey point locations. Three types of surveys are performed at each survey point as follows:

- Painted surfaces are evaluated for potential contamination under coatings using sodium iodide (NaI) gamma detectors attached to a single channel analyzer windowed for the 59 keV gamma-ray (Am^{241}).
- Direct alpha surface contamination measurements are performed using a NE Electra survey instrument with attached DP-6 probe. This data may be compared to the NaI survey data to show the fraction of contamination that is directly on the surface verses imbedded in the material matrix.
- Removable surface alpha contamination surveys were performed by swiping the survey point with a 47mm filter paper then counting the filter paper on a SAC-4 alpha counter. This data may be used to determine the effectiveness of encapsulation following the PDS.

To conservatively determine the final Average Surface Contamination Value ($ASCV_u$) for the survey unit, the source term associated with inaccessible areas of the survey unit (as described below) is added to the source term calculated by the PDS survey.

ALARA Post-Remediation Surveys

Accessible Areas

In addition to the PDS used to determine the Average Surface Contamination Value ($ASCV_u$) and source term for the survey unit, surveys were taken to determine the effectiveness of remediation efforts. Remediation is performed to demonstrate a reasonable best effort is made to maintain releases to the environment and dose to the workers ALARA.

4

Remediation may include decontamination, or removal of parts of the structure such as block wall removal.

Stairs

The stair steps that come from the 1st floor to survey unit 776029 were included in this survey unit. Contact readings on the top surface of each tread revealed significant amounts of fixed contamination (Up to 1,645,707 dpm/100 cm^2). Since access is required to the 2nd floor, and all of the stairs in each stairwell in the building are similarly contaminated, the stairs will remain in place until just prior to building demolition. The stairs may be size reduced during building demolition. Therefore, the source term, estimated at 20 µCi for the stairs, was included in this survey unit.

Floors

The floors of survey unit 776029 consist of epoxy covered concrete. In-process measurements collected on the floor of 776029 show that approximately half of the floor had elevated activity. A major portion of the floor surface of the survey unit was remediated by shaving before being re-surveyed. Remediation of the elevated floor areas resulted in a decontamination factor (DF) of 8.5 or a source term reduction of 88.2%.

Table 1

Floor Remediation Results

	Pre-Remediation (In-process)	Post-Remediation (Follow-up)
Maximum (dpm/100cm^2)	8,388,463	284,112
Minimum (dpm/100cm^2)	6,611	6,620
Average (dpm/100cm^2)	430,850	50,681
Average (µCi/m^2)	19.4	2.3
Source Term (µCi)	13,294	1,564

Walls

Survey measurements on the walls of survey unit 776029 were taken on an established 3-foot by 3-foot grid on each of the 23 wall sections within the unit. One wall section (Wall 6 section A) had average contamination values above 100,000 dpm/100cm^2. An investigation was performed on the affected wall. The initial values appear to be a result of elevated background from waste storage crates in the immediate vicinity. Follow-up survey results from this wall indicate that no remediation is required on this wall in survey unit 776029. A final survey result indicated that at one location, (Wall 3 Section E) had up to 729,124 dpm/100cm^2 present on approximately 1 ft^2 of the surface. The wall was remediated and re-surveyed. The remaining sections of the wall were all <100,000 dpm/100cm^2. Therefore, no further remediation was required for the remaining walls.

FINAL SURVEY REPORT
Survey Unit 776029

Table 2

B776/777 Survey Unit 776029 - Wall Summary

Wall	Section	Structural	Initial Characterization (Average dpm/100 cm^2)			Follow-up Characterization (Average dpm/100 cm^2)		
			Type I	Type II	Type III	Type I	Type II	Type III
776029-1	A		19,283			N/A		
776029-2	A		19,771			N/A		
776029-2	B		41,731			N/A		
776029-2	C		33,939			N/A		
776029-3	A		97,655			N/A		
776029-3	B		87,300			N/A		
776029-3	C		87,025			N/A		
776029-3	D		95,297			N/A		
776029-3	E		66,502			34,980		
776029-3	F		8,567			N/A		
776029-3	F-East		23,380			N/A		
776029-4	A		21,289			N/A		
776029-4	B		33,733			N/A		
776029-5	A		61,126			N/A		
776029-6	A			184,358	Note 1	19,876		
776029-6	B		32,597			N/A		
776029-7	A		54,022			N/A		
776029-8	A		46,287			N/A		
776029-8	B		65,839			N/A		
776029-9	A		60,305			N/A		
776029-10	A		65,489			N/A		
776029-10	B		44,637			N/A		
776029-11	A		49,384			N/A		
	Type I:	**<100,000 dpm/100 cm^2**						
	Type 2:	**>100,000 dpm/100cm^2 to <1,000,000 dpm/100cm^2**						
	Type 3:	**>1,000,000 dpm/100cm^2**						

Note 1: No remediation was performed on this wall. The initial characterization was impacted by a high background from waste crates stored nearby.

Table 3

B776/777 Survey Unit 776029 - Wall Source Term

Wall Designation	Section	Wall Type	Area (ft^2)	Area (m^2)	Average dpm/100cm^2	Total Activity (µCi)	Comments
776029-1	A	I	247.5	23	19,283	20.0	
776029-2	A	I	258.2	24	19,771	21.4	
776029-2	B	I	258.2	24	41,731	45.1	
776029-2	C	I	172.2	16	33,939	24.5	
776029-3	A	I	236.7	22	97,655	96.8	
776029-3	B	I	258.2	24	87,300	94.4	
776029-3	C	I	236.7	22	87,025	86.2	
776029-3	D	I	258.2	24	95,297	103.0	
776029-3	E	I	172.2	16	34,980	47.9	
776029-3	F	I	193.7	18	13,505	11.0	
776029-3	F-East	I	64.6	6	23,380	6.3	
776029-4	A	I	258.2	24	21,289	23.0	
776029-4	B	I	129.1	12	33,733	18.2	
776029-5	A	I	258.2	24	61,126	66.1	
776029-6	A	I	129.1	12	19,876	10.7	
776029-6	B	I	258.2	24	32,597	35.2	
776029-7	A	I	258.2	24	54,022	58.4	
776029-8	A	I	236.7	22	46,287	45.9	
776029-8	B	I	129.1	12	65,839	35.6	
776029-9	A	I	258.2	24	60,305	65.2	
776029-10	A	I	129.1	12	65,489	35.4	
776029-10	B	I	236.7	22	44,637	44.2	
776029-11	A	I	247.5	23	49,384	51.2	
Total			**4885.0**	**454**	**50,023**	**1,023.0**	

Ceilings

Two locations in the ceiling identified in the in-process surveys were removed. No additional ceiling areas in survey unit 776029 required remediation.

Inaccessible Areas

Floors

It is conservatively assumed that the contamination is uniformly distributed on both sides of each crack or seam and the contamination on the bottom of the crack or seam is the same magnitude as the contamination measured at the surface.

Two contaminated seams were identified on the floor of survey unit 776029 located in survey grids 29-34, 29-39, 29-58, and 29-63. One 20' long north-south seam (Seam 1) was found to be contaminated at levels between 1,862,926 and 5,346,106 dpm/100 cm^2, averaging 3,604,516 dpm/100 cm^2. Most of the contaminated material was removed and readings in seam 1 were significantly reduced to levels between 93,617 and 251,563 dpm/100 cm^2 averaging 172,590 dpm/100 cm^2. Each side of seam 1 is approximately 20 feet (6.1 m) long by 4 inches (0.1m) wide. The amount of activity remaining in seam 1 is estimated as:

7

Seam 1

2 * 0.61 m^2 * 172,590 dpm/100 cm^2/*10,000 cm^2/2.22E6 dpm-m^2= 9.5 µCi

The amount of source term *removed* from seam 1 is conservatively estimated as:

2 * 0.61 m^2 * (3,604,516-172,590) dpm/100 cm^2*µCi*10,000 cm^2/2.22E6 dpm-m^2= 188.6 µCi

The 2nd contaminated seam (seam 2) was found to be contaminated at levels between 1,064,828 and 4,260,881 dpm/100 cm^2, averaging 2,662,855 dpm/100 cm^2. Most of the contaminated material was removed and readings in seam 2 were significantly reduced to levels between 41,317 and 110,353 dpm/100 cm^2 averaging 75,835 dpm/100 cm^2. Each side of this seam is approximately 20 feet (6.1 m) long by 4 inches (0.1m) wide. The amount of activity remaining in seam 2 is estimated as:

Seam 2

2 * 0.61 m^2 * 75,835 dpm/100 cm^2/*10,000 cm^2/2.22E6 dpm-m^2= 1.67 µCi

The amount of source term *removed* from seam 2 is conservatively estimated as:

2 * 0.61 m^2 * (2,662,855-75,835) dpm/100 cm^2*µCi*10,000 cm^2/2.22E6 dpm-m^2= 142.2 µCi

Several cracks were also identified on the floor of survey unit 776027 located in survey grids 29-37 and 29-38. The cracks were found to be contaminated at levels between 327,484 and 3,267,056 dpm/100 cm^2, averaging 1,797,270 dpm/100 cm^2. Most of the contaminated material was removed and readings in this seam were significantly reduced to levels between 15,568 and 135,664 dpm/100 cm^2 averaging 75,616 dpm/100 cm^2. The total surface area of the cracks is approximately 20 feet (6.1 m) long by 4 inches (0.1m) wide times 2 for each side of the crack. The amount of activity remaining in the cracks is estimated as:

Cracks

2 * 0.61 m^2 * 75,616 dpm/100 cm^2/*10,000 cm^2/2.22E6 dpm-m^2= 4.13 µCi

The amount of source term *removed* from these cracks is conservatively estimated as:

2 * 0.61 m^2 * (1,797,270-75,616) dpm/100 cm^2*µCi*10,000 cm^2/2.22E6 dpm-m^2= 94.6 µCi

The total estimate of contamination removed from cracks and seams identified above, as part of the ALARA process, is ***425.4 µCi.***

Walls/Ceilings

The inaccessible areas of the walls and ceilings have the same or less potential for contamination as the accessible areas of the walls and ceilings of survey unit 776029 and therefore were not evaluated.

Columns

Inaccessible contaminated areas exist on the load bearing columns in this survey unit as a result of the 1969 fire. These inaccessible areas consist of small crevices in joints where metal surfaces are joined together, and are covered with coating. Values up to 5.94 million dpm/100 cm^2 were detected. Surveys indicated that high levels of contamination exist only in small areas of the columns. The contaminated portions of the columns were conservatively estimated to be 0.9 m^2 for each column. The amount of activity remaining in the area is estimated as ***264 μCi.***

PDS Data Summary

The values for the accessible areas and inaccessible areas were summed and divided by the total area for the survey unit to calculate the "Average Surface Contamination Value" ($ASCV_u$) and source term for the survey unit. The results are summarized in Table 4 below:

Table 4:

PDS Final Results

	Final Results
776029 Inaccessible Area Source Term μCi)	279.3
776029 Accessible Area Source Term (μCi)	1,943.3
776029 Stair Source Term (μCi)	20
776029 Total Source Term (μCi)	2,242.6
Survey Unit Area (m^2)	1972
($ASCV_u$) ($\mu Ci/m^2$)	1.14
($ASCV_u$) (dpm/100cm^2)	25,246.3

Table 4 Notes:

Inaccessible areas source term from Section 4 of this report.

Accessible area source term is the sum of source terms attributed to floors, walls and ceiling as determined by the final PDS survey.

Total Source Term equals the sums of the source terms of Inaccessible Area + Accessible Area.

Total Source Term = (279.3+1,943.3+20.0) μCi = 2,242.6 μCi

Average Surface Contamination for the Survey Unit ($ASCV_u$) in dpm/100cm^2 equals:

($ASCV_u$) = (2,242.6 μCi)(22,200 dpm/100cm^2 / 1 $\mu Ci/m^2$) / (1,972 m^2)= 25,246.3 dpm/100cm^2

9

776029 Follow-up Data

Location #	Column letter	Column Number	North	East	Surface	Gross Counts	In-process dpm/100cm^2	Follow-up dpm/100cm^2
29-1	F	1	16	8	Floor	5115	128,535	11,571
29-1A	F	1	15	2	Floor	3921	32,496	32,489
29-2	F	1	14	13	Floor	5738	178,646	16,844
29-2A	F	1	12	18	Floor	4669	92,661	92,641
29-3	F	2	11	8	Floor	8016	361,876	11,571
29-3A	F	2	15	3	Floor	5083	125,961	16,844
29-4	F	2	13	13	Floor	5585	166,339	11,571
29-4A	F	2	19	14	Floor	4345	66,600	66,586
29-5	F	3	17	1	Floor	5214	136,498	11,571
29-5A	F	3	17	4	Floor	4386	69,898	69,883
29-6	F	3	11	19	Floor	5000	119,285	55,810
29-6A	F	3	18	13	Floor	4203	55,178	55,166
29-7	F	4	19	9	Floor	5146	131,028	11,571
29-7A	F	4	15	5	Floor	4056	43,354	43,345
29-8	F	4	19	11	Floor	7864	349,650	16,844
29-8A	F	4	13	6	Floor	4005	39,252	39,244
29-9	F	5	19	1	Floor	11788	665,276	261,635
29-9A	F	5	12	7	Floor	4146	50,593	50,582
29-10	F	5	13	19	Floor	6072	205,511	16,844
29-10A	F	5	14	14	Floor	4136	49,789	49,778
29-11	F	6	19	4	Floor	5619	169,074	11,571
29-11A	F	6	15	3	Floor	3845	26,383	26,377
29-12	F	6	19	19	Floor	7360	309,111	123,521
29-12A	F	6	15	18	Floor	4751	99,257	99,235
29-13	F	6	1	19	Floor	37691	2,748,215	284,112
29-13A	F	6	8	2	Floor	3349	15,700	15,697
29-14	F	6	1	1	Floor	28314	1,993,978	31,768
29-14A	F	6	9	1	Floor	3440	15,700	15,697
29-14B	F	6	4	5	Floor	3376	15,700	15,697
29-15	F	5	1	19	Floor	11800	665,678	20,979
29-15A	F	5	5	11	Floor	3947	34,024	34,017
29-16	F	5	6	7	Floor	3948	34,104	34,097
29-17	F	4	8	11	Floor	4068	43,757	43,747
29-17A	F	4	5	16	Floor	3562	15,700	15,697
29-18	F	4	4	9	Floor	3654	15,700	15,697
29-19	F	3	9	19	Floor	5415	152,102	98,752
29-19A	F	3	5	15	Floor	4372	68,209	68,194
29-20	F	3	1	2	Floor	9064	445,609	22,477
29-20A	F	3	6	4	Floor	5075	124,754	11,571
29-21	F	2	1	13	Floor	6252	219,426	18,174
29-21A	F	2	3	16	Floor	4564	83,652	83,634
29-22	F	2	1	5	Floor	6222	217,013	23,976

776029 Follow-up Data

Location #	Column letter	Column Number	North	East	Surface	Gross Counts	In-process dpm/100cm^2	Follow-up dpm/100cm^2
29-22A	F	2	2	2	Floor	4511	79,389	11,571
29-23	F	1	9	16	Floor	4438	73,517	73,501
29-23A	F	1	4	14	Floor	3830	24,613	24,608
29-24	F	1	9	9	Floor	4331	64,911	64,897
29-24A	F	1	4	6	Floor	3713	15,700	15,697
29-25	E	1	19	8	Floor	3599	6,611	6,620
29-26	E	1	18	12	Floor	3564	6,611	6,620
29-27	E	2	11	9	Floor	4201	21,930	21,962
29-27A	E	2	15	13	Floor	3686	6,611	6,620
29-28	E	2	15	13	Floor	4927	46,424	46,492
29-28A	E	2	19	16	Floor	4143	19,973	20,002
29-29	E	3	13	5	Floor	4502	32,085	32,132
29-30	E	3	12	15	Floor	4266	24,123	24,158
29-31	E	4	12	9	Floor	4704	38,901	38,957
29-32	E	4	15	15	Floor	3897	30,002	29,996
29-33	E	5	19	3	Floor	4340	65,635	65,621
29-33A	E	5	11	7	Floor	3055	15,700	15,697
29-34	E	5	19	19	Floor	34536	2,494,443	130,276
29-34A	E	5	11	13	Floor	2982	15,700	15,697
29-35	E	6	19	0	Floor	66229	5,043,663	110,288
29-35A	E	6	11	5	Floor	6993	279,028	58,591
29-36	E	6	7	7	Floor	42033	3,097,463	35,814
29-36A	E	6	11	11	Floor	5226	136,900	16,844
29-37	E	6	1	11	Floor	31624	2,270,030	90,508
29-37A	E	6	9	11	Floor	5342	156,043	90,508
29-38	E	6	1	9	Floor	32861	2,369,528	46,153
29-38A		6	9	6	Floor	5049	132,476	46,153
29-39	E	5	4	13	Floor	560	6,611	6,620
29-40	E	5	4	7	Floor	1148	6,611	6,620
29-41	E	4	11	11	Floor	5150	130,787	30,269
29-41A	E	4	19	19	Floor	4219	55,902	55,890
29-42	E	4	9	3	Floor	4324	26,080	26,118
29-43	E	3	8	15	Floor	4309	25,574	25,611
29-44	E	3	9	2	Floor	4611	35,763	35,815
29-45	E	2	9	15	Floor	4780	41,465	41,525
29-46	E	2	5	6	Floor	4638	36,674	36,727
29-46A	E	2	1	1	Floor	3156	6,611	6,620
29-47	E	1	1	11	Floor	3796	8,266	8,278
29-48	E	1	4	5	Floor	3582	6,611	6,620
29-49	D	1	14	4	Floor	3659	6,611	6,620
29-50	D	1	11	19	Floor	3938	13,057	13,076
29-51	D	2	19	17	Floor	4287	24,832	24,868

776029 Follow-up Data

Location #	Column letter	Column Number	North	East	Surface	Gross Counts	In-process dpm/100cm^2	Follow-up dpm/100cm^2
29-52	D	2	11	17	Floor	4313	25,709	25,746
29-53	D	3	14	5	Floor	4870	118,078	58,650
29-53A	D	3	19	1	Floor	4189	63,302	63,288
29-54	D	3	11	19	Floor	5087	135,533	41,083
29-54A	D	3	19	16	Floor	4418	81,722	81,704
29-55	D	4	11	1	Floor	5197	144,380	44,403
29-56	D	4	17	11	Floor	5139	129,902	41,913
29-56A	D	4	11	18	Floor	4355	66,841	66,827
29-57	D	5	17	2	Floor	4326	26,147	26,186
29-58	D	5	17	19	Floor	9138	188,498	91,019
29-58A	D	5	11	13	Floor	3786	7,929	7,940
29-59	D	6	19	8	Floor	24093	1,664,276	56,022
29-59A	D	6	11	1	Floor	6262	230,043	33,613
29-60	D	6	19	11	Floor	17582	1,140,565	90,604
29-60A	D	6	11	14	Floor	6506	249,670	189,369
29-61	D	6	2	11	Floor	98796	7,672,996	139,295
29-61A	D	6	9	15	Floor	5509	169,476	51,872
29-62	D	6	2	6	Floor	107691	8,388,463	102,362
29-62A	D	6	9	1	Floor	6432	243,717	53,671
29-63	D	5	1	19	Floor	10894	602,617	44,126
29-63A	D	5	9	13	Floor	4205	64,589	64,575
29-64	D	5	9	5	Floor	5192	134,165	27,942
29-64A	D	5	6	5	Floor	4219	55,902	55,890
29-65	D	4	1	15	Floor	5795	182,667	125,600
29-65A	D	4	5	15	Floor	4637	89,524	89,504
29-66	D	4	1	1	Floor	8581	416,572	142,338
29-66A	D	4	9	9	Floor	4842	115,826	54,501
29-67	D	3	1	19	Floor	13916	845,691	213,299
29-67A	D	3	8	11	Floor	4894	120,009	41,775
29-68	D	3	1	3	Floor	5162	141,565	82,996
29-69	D	2	1	16	Floor	6919	113,632	228,100
29-69A	D	2	9	19	Floor	4108	18,792	18,820
29-70	D	2	1	1	Floor	4051	16,869	16,894
29-71	D	1	3	19	Floor	4033	16,262	16,286
29-72	D	1	6	8	Floor	3803	8,502	8,515

Survey Instructions
Building 776 2nd Floor
Survey Unit 776029

Purpose:

This instruction provides guidance for collecting gross gamma and removable contamination data to quantify the amount of residual contamination in Survey Unit 776029 prior to demolition. NaI measurements are performed in accordance with " INS-535-Ludlum2350-1 with Sodium Iodide Detector".

Equipment and materials:

1. A Ludlum 44-17 attached to a Ludlum 2350-1 set to collect five-minute counts that will be displayed on its LCD window.
2. A Bicron G-5 attached to a Ludlum 2350-1 set to collect five-minute counts that will be displayed on its LCD window.
3. One Electra with attached DP-6, calibrated and daily response checked.
4. Two probe holders, one for the G-5 and one for the 44-17 with tin shielding.
5. Calibrated and daily response checked SAC-4.
6. Measuring tape or laser range finder.

Note: The NE Electra with DP-6 probe and the Eberline SAC-4 shall be used in accordance with RSP- 7.01 and 7.02

Procedure:

1. Inspect instrument for obvious damage and ensure battery voltage is equal to or greater than 4.6 volts. If battery voltage is less than 4.6 volts change the batteries.
2. Complete daily performance checks for Sodium Iodide detectors to ensure the instrument is functioning properly by using Americium-241 source TS-912. Record results on Sodium Iodide Data Sheet.
3. For floor and concrete wall background measurements, perform a 300-second background count with a Bicron G-5 for floors or Ludlum 44-17 for walls at background location in room 201-A near column B-13. Record background counts next to "Bkg Floor" or "Bkg Concrete Wall"in background column of attached "Sodium Iodide Data Collection" sheets as needed.
4. For block wall background measurements, perform a 300-second background count with a Ludlum 44-17 at the background location in room 219. Record background counts next to "Bkg Block Wall" in background column of attached Sodium Iodide data collection sheets as needed.
5. For ceiling and metal floor background measurements, perform a 300-second background count with a Ludlum 44-17 or Bicron G-5 at background location in room 201-A near column B-13. Hold the probe waist high, pointed toward ceiling using a sheet metal plate in front of the detector (take background measurement in this configuration). Record background counts next to "Bkg Metal Floor" for the G-5 and " Bkg Metal Ceiling" for the 44-17 on the attached Sodium Iodide data collection sheets as needed.
6. Mark the sample locations on the surfaces to be measured. Take all measurements on contact with the marked surface using tin side shields on the Bicron G-5 and tin side and back shields on the Ludlum 44-17. All Sodium Iodide readings shall have 300 second count times.
7. Collect sodium Iodide, total surface activity and removable surface activity measurements at all locations marked on the attached map.
8. Record the NaI and NE Electra measurements on the attached sheet. Note any items or conditions that may have affected the measurement in the "remarks" section.
9. Count swipes for 60 seconds with a SAC-4, record result on attached sheet for removable contamination.

Survey Instructions
Building 776 2nd Floor
Survey Unit 776029

Table 776029-1: Survey Requirements				
Surface	**Type of Survey**	**Probe**	**Placement**	**Count Time**
Floor	Total Alpha Activity	Bicron G-5	On contact	300 seconds
All Surfaces	Total Alpha Activity	Electra with DP-6	On contact	60 seconds
Block walls	Total Alpha Activity	Bicron G-5 or Ludlum 44-17	On contact	300 seconds
All Surfaces	Removable Alpha	SAC-4	Swipe in placed in tray	60 seconds
Ceiling	Total Alpha Activity	Ludlum 44-17	On Contact	300 seconds
Block Walls	Background measurement	Bicron G-5 or Ludlum 44-17	On contact with wall in room 219	300 seconds
Metal Floors	Background measurement	Bicron G-5 or Ludlum 44-17	Probe waist high, pointed toward ceiling with sheet metal plate on end in room 201-A near column B-13	300 seconds
Floors and cement walls	Background measurement	Bicron G-5 or Ludlum 44-17	On contact with floor in room 201-A near column B-13	300 seconds
Metal ceilings	Background measurement	Ludlum 44-17	Probe waist high, pointed toward ceiling with sheet metal plate on end in room 201 near column B-13	300 seconds

Data and Sodium Iodide Instrument Information

Survey Area:	2nd Floor	Survey Unit:	776029	Survey Date(s):	12/09/04

Instrument Specifications

Instrument #	1	2
Meter Model:	Ludlum 2350-1	Ludlum 2350-1
Meter Serial #:	192614	201184
Detector Model:	Bicron G-5	Ludlum 44-17
Detector #:	B716T	212344
Detector Size (cm^2):	125	17.8
Calibration Due Date:	12/10/04	5/9/05
Count Time (min)	5	5
Contact Efficiency	6.40%	8.70%

Ratio Used

Pu to Am - 241	8.1

Comments

In cases where the critical level is greater than the calculated dpm/100cm2, the critical level will be used for statistical analysis.

Count Times for backgrounds and samples are equal.

Attenuation Factors: Based on observation of Floors, Walls and Ceilings.

Background (Gross)

Instrument #	1	2
Gamma (Ceilings)	N/A	203
Gamma (Floors)	6925	N/A
Gamma (Block Walls)	N/A	510
Gamma (Solid Walls)	N/A	N/A

Background (cpm)

Instrument #	1	2
Gamma (Ceilings)	N/A	40.6
Gamma (Floors)	1385	N/A
Gamma (Block Walls)	N/A	102
Gamma (Metal Walls)	N/A	N/A

Efficiencies (cpm/dpm)

Instrument #	1	2
Thin/No Paint	0.064	0.086
Epoxy	0.052	0.070
Other	0.061	0.083

Coatings	Thickness (inches)
Thin/No Paint	0.007
Epoxy	0.250
Other	0.06

Total Activity Estimates Using Sodium Iodide Instruments

Survey Area:	2nd Floor	Survey Unit:	776029	Survey Date(s):	12/09/04

Sample Location #	RCT ID #	Instrument #	Gross Counts	Critical Level (dpm/cm2)	Total Alpha (dpm/cm2)
1	1	1	6876	3,944	3,944
2	1	1	7,559	3,944	12,916
3	1	1	10,860	3,944	80,164
4	2	1	9348	3,944	49,361
5	2	1	7103	3,944	3,944
6	2	1	6574	3,944	3,944
7	1	2	628	5,529	12,418
8	1	2	679	5,529	17,786
9	N/A	N/A	N/A	N/A	N/A
10	1	1	9,515	3,944	52,763
11	1	1	9601	3,944	54,515
12	2	1	5908	3,944	3,944
13	2	1	5,320	3,944	3,944
14	1	2	568	5,529	6,104
15	N/A	N/A	N/A	N/A	N/A
16	1	2	221	3,488	3,488
17	N/A	N/A	N/A	N/A	N/A
18	N/A	N/A	N/A	N/A	N/A
19	N/A	N/A	N/A	N/A	N/A
20	N/A	N/A	N/A	N/A	N/A
21	1	2	232	3,488	3,488
22	1	2	233	3,488	3,488
23	1	2	947	5,529	45,990
24	1	2	1146	5,529	66,933
25	1	2	769	5,529	27,257
26	1	2	710	5,529	21,048
27	1	2	890	5,529	39,991
28	1	2	882	5,529	39,149
29	2	1	8804	3,944	38,279
30	1	2	717	5,529	21,785

Sodium Iodide Data and Instrument Information

Survey Area:	2nd floor	Survey Unit:	776029	Survey Date(s):	12/09/04 12/16/04

Instrument Specifications

Instrument #	1	2
Meter Model:	Ludlum 2350-1	Ludlum 2350-1
Meter Serial #:	201184	203499
Detector Model:	Ludlum 44-17	Bicron G-5
Detector #:	212344	B940T
Detector Size (cm^2):	17.8	125
Calibration Due Date:	5/9/05	6/8/05
Count Time (min)	5	5
Contact Efficiency	8.70%	6.05%

Background (Gross)

Instrument #	1	2
Gamma (Ceilings)	228	N/A
Gamma (Floors)	N/A	11084
Gamma (Walls)	N/A	N/A

Background (cpm)

Instrument #	1	2
Gamma (Ceilings)	45.6	N/A
Gamma (Floors)	N/A	2216.8
Gamma (Walls)	N/A	N/A

Efficiencies (cpm/dpm)

Instrument #	1	2
Thin/No Paint	0.086	0.060
Epoxy	0.078	0.054
Other	0.083	0.057

Ratio Used

Pu to Am - 241	8.1

Comments

In cases where the critical level is greater than the calculated dpm/100cm2, the critical level will be used for statistical analysis.

Count Times for backgrounds and samples are equal.

Ratio determined using TBD-076 assuming 1969 is year Zero.

Attenuation Factors: Based on direct observation.

Coatings	Thickness (inches)
Thin/No Paint	0.015
Epoxy	0.125
Other	0.06

Total Activity Estimates Using Sodium Iodide Instruments

Survey Area:	2nd floor	Survey Unit:	776029	Survey Date(s):	12/09/04
					12/16/04

Sample Location #	RCT ID #	Instrument #	Gross Counts	Critical Level (dpm/100cm2)	Total Alpha (dpm/100cm2)
1	N/A	N/A	N/A	N/A	N/A
2	N/A	N/A	N/A	N/A	N/A
3	N/A	N/A	N/A	N/A	N/A
4	N/A	N/A	N/A	N/A	N/A
5	N/A	N/A	N/A	N/A	N/A
6	N/A	N/A	N/A	N/A	N/A
7	N/A	N/A	N/A	N/A	N/A
8	N/A	N/A	N/A	N/A	N/A
9	2	2	11,913	5,315	17,988
10	N/A	N/A	N/A	N/A	N/A
11	N/A	N/A	N/A	N/A	N/A
12	N/A	N/A	N/A	N/A	N/A
13	N/A	N/A	N/A	N/A	N/A
14	N/A	N/A	N/A	N/A	N/A
15	1	1	252	3,722	3,722
16	N/A	N/A	N/A	N/A	0
17	1	1	275	3,722	4,980
18	1	1	217	3,722	3,722
19	1	1	221	3,722	3,722
20	1	1	280	3,722	5,510

Total Surface Activity

Survey Area:		2nd Floor	Survey Unit:		776029			
Meter Model:		NE Electra w/ DP6 Probe					Dates Counted:	12/10/04
Instrument #:		1246	2338	n/a	n/a	n/a	A priori MDA:	94
Cal. Due Date:		1/26/04	12/29/04	n/a	n/a	n/a	Avg. Local Bkgd	2.0
Efficiency (c/d):		0.220	0.217	n/a	n/a	n/a	Avg. Efficiency	0.219
Sample Location #	RCT ID #	Inst. #	Instrument (cpm)		Local Bkgd (cpm)		(dpm/100 cm^2)	
1	1	1	37		0.0		168.9	
2	1	1	15		2.0		59.4	
3	1	1	10		0.0		45.7	
4	1	1	17		2.0		66.2	
5	1	1	29		2.0		123.3	
6	1	1	146		1.0		662.1	
7	2	1	8		3.0		22.8	
8	2	1	2		1.0		4.6	
9	1	1	373		1.0		1698.6	
10	1	1	6		0.0		27.4	
11	1	1	19		1.0		82.2	
12	1	1	11		0.0		50.2	
13	1	1	12		2.0		45.7	
14	2	1	3		1.0		9.1	
15	1	2	5		1.0		18.3	
16	2	1	1		2.0		-4.6	
17	1	2	4		2.0		9.1	
18	[illegible]	1	0		3.0		-13.7	
19	1	1	2		0.0		9.1	
20	1	1	6		2.0		18.3	
21	2	1	1		2.0		-4.6	
22	2	1	4		3.0		4.6	
23	2	1	1		3.0		-9.1	
24	2	1	0		0.0		0.0	
25	1	1	5		9.0		-18.3	
26	2	1	3		2.0		4.6	
27	1	1	5		6.0		-4.6	
28	1	1	15		6.0		41.1	
29	1	1	21		2.0		86.8	
30	1	1	2		1.0		4.6	
						MIN	-18.3	
						MAX	1698.6	
						MEAN	106.9	
						SD	324.7	

Removable Activity

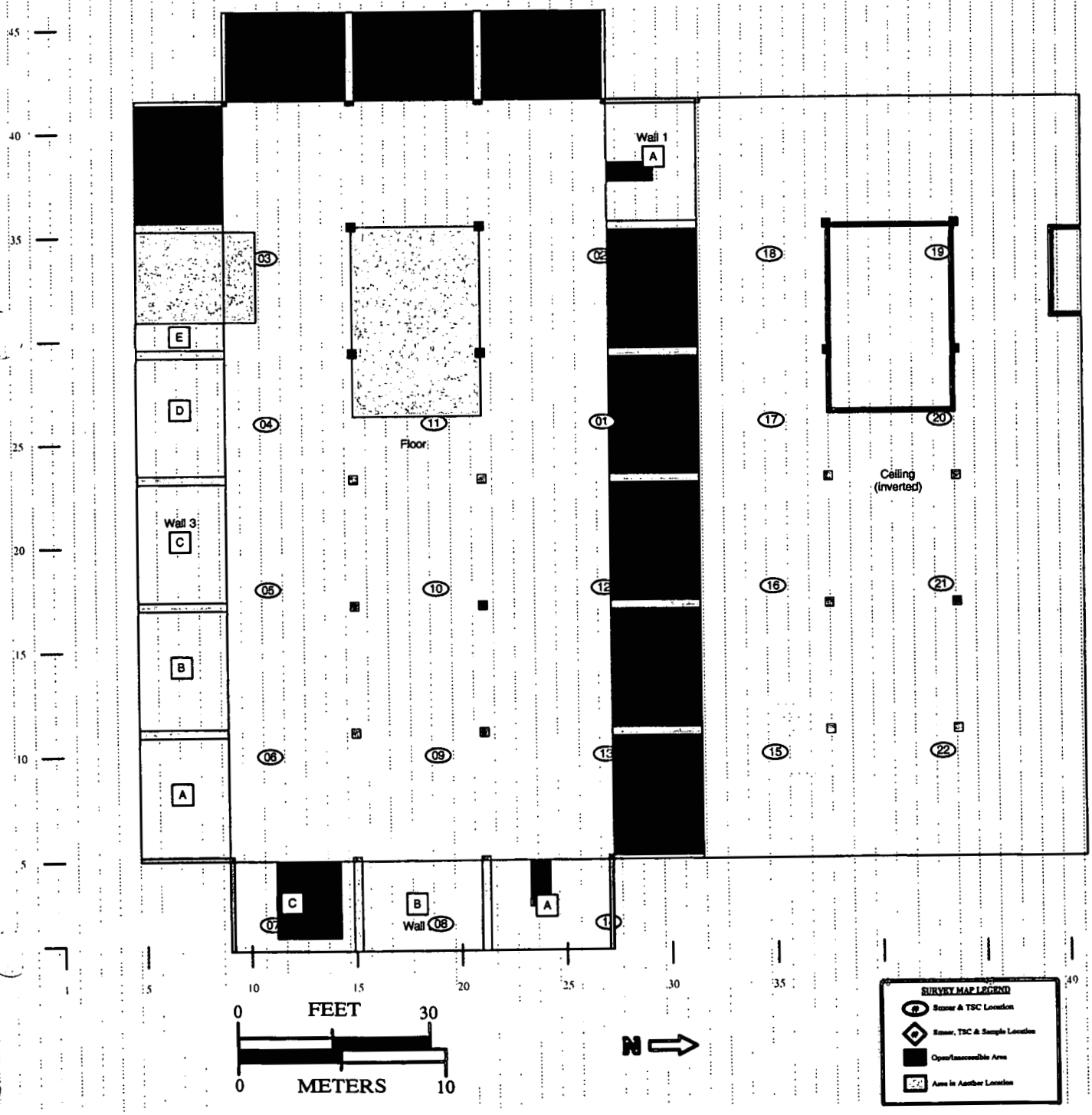
Survey Area:		2nd Floor	Survey Unit:		776029
Dates Counted:	12/9/04				
A priori MDA:	16				
Efficiency (c/d)	0.333				
Smear Location Number	Smear Results				
	RCT ID #	Serial Number	Gross (cpm)	Bkg.	(dpm/100 cm^2)
1	1	1	0	0.3	-1
2	1	2	1	0.2	2
3	1	3	1	0.3	2
4	1	1	0	0.3	-1
5	1	2	0	0.2	-1
6	1	3	1	0.3	2
7	2	2	1	0.2	2
8	2	3	1	0.3	2
9	1	1	1	0.3	2
10	1	2	0	0.2	-1
11	1	3	0	0.3	-1
12	1	1	0	0.3	-1
13	1	2	0	0.2	-1
14	2	1	0	0.3	-1
15	1	1	0	0.1	0
16	2	1	1	2.0	-3
17	1	1	3	0.1	9
18	1	1	0	0.1	0
19	1	1	1	0.1	3
20	1	1	0	0.1	0
21	2	2	0	0.2	-1
22	2	3	0	0.3	-1
23	2	3	2	0.3	5
24	2	1	0	0.2	-1
25	1	3	0	0.3	-1
26	2	1	0	0.3	-1
27	1	1	0	0.3	-1
28	1	2	0	0.2	-1
29	1	3	0	0.3	-1
30	1	1	0	0.3	-1
				MIN	-3.0
				MAX	**8.7**
				MEAN	**0.4**
				SD	2.3

RADIOLOGICAL CLOSEOUT SURVEY FOR THE 776 CLUSTER

Survey Area: 2nd Floor **Survey Unit:** 776029 **Classification:** NA
Building: 776
Survey Unit Description: Second floor- Rooms 227 & 225

Total Floor Area: 685 sq. m **Total Area:** 1972 sq. m **Random Start Grid Size:** 8 x 8 sq. m

SURVEY UNIT 776029 - MAP 1 OF 2



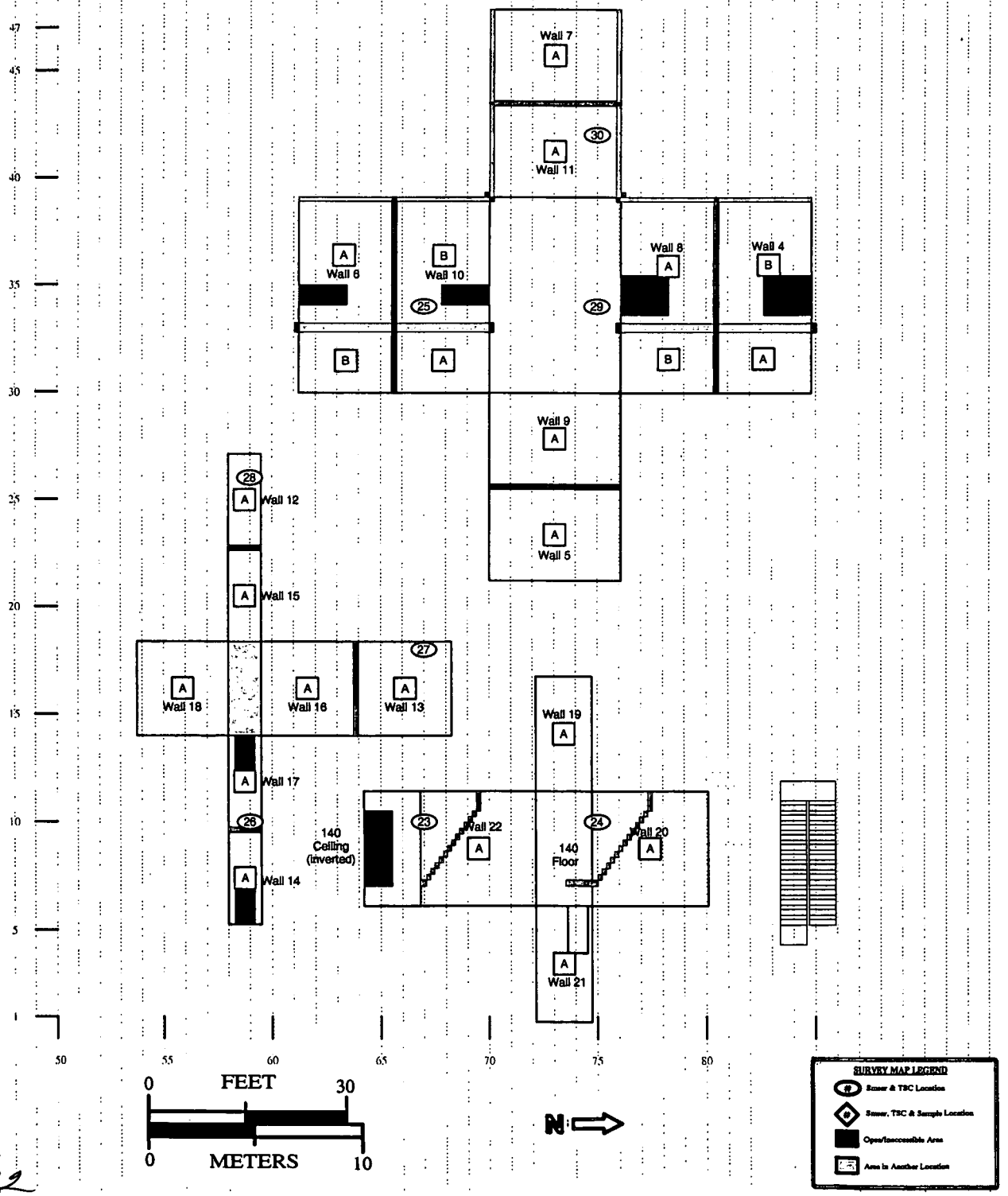
21

RADIOLOGICAL CLOSEOUT SURVEY FOR THE 776 CLUSTER

Survey Area: 2nd Floor **Survey Unit: 776029** **Classification: NA**
Building: 776
Survey Unit Description: Second floor- Rooms 227 & 225

Total Floor Area: 685 sq. m **Total Area: 1972 sq. m** **Random Start Grid Size: 8 x 8 sq. m**

SURVEY UNIT 776029 - MAP 2 OF 2



22/22